(19) World Intellectual Property Organization

International Bureau





(43) International Publication Date 6 October 2005 (06.10.2005)

PCT

(10) International Publication Number WO 2005/093735 A1

(51) International Patent Classification⁷: G11B 7/135

(21) International Application Number:

PCT/IB2005/050918

(22) International Filing Date: 16 March 2005 (16.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 04101208.9 24 March 2004 (24.03.2004) EP

(71) Applicant (for all designated States except US): KONIN-KLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

- (75) Inventors/Applicants (for US only): TUKKER, Teunis, W. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). VREHEN, Joris, J. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agents: UITTENBOGAARD, Frank et al.; Prof. Holst-laan 6, NL-5656 AA Eindhoven (NL).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

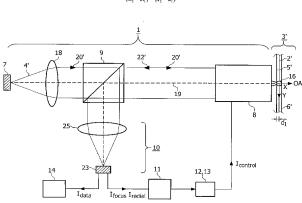
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,

[Continued on next page]

(54) Title: OPTICAL RECORD CARRIER SCANNING DEVICE



(57) **Abstract:** An optical scanning device for scanning optical record carriers having information layers at different information layer depths within the carrier, the optical record carriers including a first optical record carrier (3') having an information layer (2') at a first information layer depth d_1 , a second optical record carrier (3'') having an information layer (2'') at a second information layer depth d_2 and a third optical record carrier (3''') having an information layer (2''') at a third information layer depth d_3 , wherein $d_3 < d_2 < d_1$. The scanning device includes a radiation source system (7) for producing first, second and third radiation beams (4', 4'', 4'''), for scanning said first, second and third record carriers (3'; 3''; 3'''), respectively, the device including a diffraction structure (48) introducing first, second and third, different, wavefront modifications into at least part of the first, second and third, radiation beams, respectively. The diffraction structure (48) is arranged to operate at selected diffraction orders m_1 , m_2 , m_3 , for the first, second and third radiation beams, respectively, and is characterised in that the diffraction structure (48) is arranged such that the following relation holds: Formula (I).



WO 2005/093735 A1



MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.